

WHAT IS CLAIMED IS

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1. A method of training for a recording medium reproduction equalizer, comprising, in a training operation for optimizing a multiplication coefficient for each tap of an FIR equalizer  
10 equalizing a read signal read from a recording medium, the steps of:

a) utilizing, as a restricted coefficient updating vector applied for updating the multiplication coefficient for each tap of the FIR  
15 filter, a vector obtained from projecting, onto a plane perpendicular to a predetermined restricting conditioning vector, a coefficient updating vector determined based on an equalizer error between the output of the FIR equalizer and a reproduction  
20 output determined therefrom, and a delayed input value for each tap of the FIR equalizer; and

b) utilizing, as the predetermined restricting conditional vector, a coefficient vector comprising the multiplication coefficients for the  
25 equalizer obtained upon calculating the equalizer error.

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2. A method of training for a recording medium reproduction equalizer, comprising, in a training operation for optimizing a multiplication coefficient for each tap of an FIR equalizer  
35 equalizing a read signal read from a recording medium, the steps of:

a) utilizing, as a restricted coefficient

updating vector applied for updating the multiplication coefficient for each tap of the FIR filter, a vector obtained by projecting, onto a plane perpendicular to a predetermined restricting conditional vector, a coefficient updating vector determined based on an equalizer error between the output of the FIR equalizer and a reproduction output determined therefrom, and a delayed input value for each tap of the FIR equalizer; and

10           b) utilizing, as the predetermined restricting conditional vector, a vector which is a difference between a coefficient vector comprising the multiplication coefficients for the equalizer obtained upon calculating the equalizer error and

15           another coefficient vector immediately subsequent thereto obtained in the same condition.

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3. A method of training for a recording medium reproduction equalizer, comprising, in a training operation for optimizing a multiplication coefficient for each tap of an FIR equalizer

25           equalizing a read signal read from a recording medium, the steps of:

          a) utilizing, as a restricted coefficient updating vector applied for updating the multiplication coefficient for each tap of the FIR

30           filter, a vector obtained by projecting, onto a plane perpendicular to a predetermined restricting conditional vector, a coefficient updating vector determined based on an equalizer error between the output of the FIR equalizer and a reproduction

35           output determined therefrom and a delayed input value for each tap of the FIR equalizer; and

          b) utilizing, as the predetermined

restricting conditional vector, a vector which is a  
difference between a subsequent coefficient vector  
obtained in the same condition immediately  
subsequent to and an antecedent coefficient vector  
5 obtained in the same condition immediately  
antecedent to a reference coefficient comprising the  
multiplication coefficients for the equalizer  
obtained upon calculating the equalizer error.

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4. A recording medium reproduction  
apparatus comprising:  
15 training part training for a recording  
medium reproduction equalizer,  
wherein:  
in a training operation for optimizing a  
multiplication coefficient for each tap of an FIR  
20 equalizer equalizing a read signal read from a  
recording medium, said training part utilizes, as a  
restricted coefficient updating vector applied for  
updating the multiplication coefficient for each tap  
of the FIR filter, a vector obtained by projecting,  
25 onto a plane perpendicular to a predetermined  
restricting conditional vector, a coefficient  
updating vector determined based on an equalizer  
error between the output of the FIR equalizer and a  
reproduction output determined therefrom and a  
30 delayed input value for each tap of the FIR  
equalizer; and  
said training part utilizes, as the  
predetermined restricting conditional vector, a  
coefficient vector comprising the multiplication  
35 coefficients for the equalizer obtained upon  
calculating the equalizer error

5. A recording medium reproduction apparatus comprising:

training part training for a recording medium reproduction equalizer,

5 wherein:

in a training operation for optimizing a multiplication coefficient for each tap of an FIR equalizer equalizing a read signal read from a recording medium, said training part utilizes, as a  
10 restricted coefficient updating vector applied for updating the multiplication coefficient for each tap of the FIR filter, a vector obtained by projecting, onto a plane perpendicular to a predetermined restricting conditional vector, a coefficient  
15 updating vector determined based on an equalizer error between the output of the FIR equalizer and a reproduction output determined therefrom and a delayed input value for each tap of the FIR equalizer; and

20 said training part utilizes, as the predetermined restricting conditional vector, a vector which is a difference between a coefficient vector comprising the multiplication coefficients for the equalizer obtained upon calculating the  
25 equalizer error and another coefficient vector immediately subsequent thereto obtained in the same condition.

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6. A recording medium reproduction apparatus comprising:

35 training part training for a recording medium reproduction equalizer,

wherein:

in a training operation for optimizing a

multiplication coefficient for each tap of an FIR equalizer equalizing a read signal read from a recording medium, said training part utilizes, as a restricted coefficient updating vector applied for  
5 updating the multiplication coefficient for each tap of the FIR filter, a vector obtained by projecting, onto a plane perpendicular to a predetermined restricting conditional vector, a coefficient updating vector determined based on an equalizer  
10 error between the output of the FIR equalizer and a reproduction output determined therefrom and a delayed input value for each tap of the FIR equalizer; and

                    said training part utilizes, as the  
15 restricting conditional vector, a vector which is a difference between a subsequent coefficient vector obtained in the same condition immediately subsequent to and an antecedent coefficient vector obtained in the same condition immediately  
20 antecedent to a reference coefficient comprising the multiplication coefficients for the equalizer obtained upon calculating the equalizer error.

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7. The method as claimed in claim 2,  
wherein:

                    said coefficient vector immediately  
30 subsequent comprises the multiplication coefficients shifted toward the higher order side by one order with respect to those of the current coefficient vector and a predetermined number inserted as the lowest order coefficient.

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8. The method as claimed in claim 8,  
wherein:  
said predetermined number comprises zero.

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9. The method as claimed in claim 3,  
wherein:  
10 said coefficient vector immediately  
subsequent comprises the multiplication coefficients  
shifted toward the higher order side by one order  
with respect to those of the reference coefficient  
vector and a first predetermined number inserted as  
15 the lowest order coefficient; and  
said coefficient vector immediately  
antecedent comprises the multiplication coefficients  
shifted toward the lower order side by one order  
with respect to those of the reference coefficient  
20 vector and a second predetermined number inserted as  
the highest order coefficient.

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10. The method as claimed in claim 8,  
wherein:  
said first predetermined number comprises  
zero, and said second predetermined number also  
30 comprises zero.

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11. The apparatus as claimed in claim 5,  
wherein:  
said coefficient vector immediately

subsequent comprises the multiplication coefficients  
shifted toward the higher order side by one order  
with respect to those of the current coefficient  
vector and a predetermined number inserted as the  
5 lowest order coefficient.

10                   12. The apparatus as claimed in claim 11,  
wherein:  
said predetermined number comprises zero.

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13. The apparatus as claimed in claim 6,  
wherein:  
said coefficient vector immediately  
20 subsequent comprises the multiplication coefficients  
shifted toward the higher order side by one order  
with respect to those of the reference coefficient  
vector and a first predetermined number inserted as  
the lowest order coefficient; and  
25 said coefficient vector immediately  
antecedent comprises the multiplication coefficients  
shifted toward the lower order side by one order  
with respect to those of the reference coefficient  
vector and a second predetermined number inserted as  
30 the highest order coefficient.

35                   14. The apparatus as claimed in claim 13,  
wherein:  
said fir predetermined number comprises

zero, and said second predetermined number also comprises zero.